



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,755	05/16/2002	Stanton James Dent	DC4968	9286
137	7590	01/11/2005	EXAMINER	
DOW CORNING CORPORATION CO1232			IM, JUNGHWA M	
2200 W. SALZBURG ROAD			ART UNIT	
P.O. BOX 994			PAPER NUMBER	
MIDLAND, MI 48686-0994			2811	

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/068,755

Applicant(s)

DENT ET AL.

Examiner

Junghwa M. Im

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) \_\_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 and 23-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amako et al. (EP 1041117), hereinafter Amako in view of Shiobara et al. (US 6083774), hereinafter Shiobara.

Regarding claim 1, Figure 1 of Amako shows a semiconductor wafer with an active surface comprising an integrate circuit (an inherent element to operate functionally), bonding pads (which are needed for an electrical connection); and a cured silicone covering a portion of the active surface, and the silicone member comprising;

(A) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule (paragraph 0016) with any remaining silicon-bonded organic groups being independently selected from monovalent hydrocarbon groups (paragraph 0017) free of aliphatic unsaturation (paragraph 0021),

(B) an organohydrogensiloxane containing an average of at least two silicon--bonded hydrogen atoms per molecule (paragraph 0035),

(C) an inorganic filler (paragraph 0038),

(D) a hydrosilylation catalyst (paragraph 0030), and heating the silicone deposit to form the cured silicone member (paragraph 0039).

Since Amako discloses a cured silicone member having the same composition to

the Applicant's disclosure, it is inherent or alternatively obvious that the cured silicone of Amako has a coefficient of linear expansion and a modulus in a vicinity of the range recited in the pending claim.

Amako discloses the substantially the entire claimed structure except "a inorganic filler having a area surface less than  $25 \text{ m}^2/\text{g}$ ." Shiobara discloses an organic filler used in the curable resin having a surface area less than  $25 \text{ m}^2/\text{g}$  for a semiconductor packaging (col.7, lines 4-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Shiobara to a semiconductor device of Amako to provide a proper particle size distribution for the cured silicone improving the contact between the interfaces.

In addition, Shiobara further discloses that a particular size (which can be expressed in terms of the surface area) of the filler can be determined based on the configuration of the packaging device (col.1, lines 1-29).

Regarding claim 2, it is obvious that the wafer further comprises streets for separation of devices on a wafer.

Regarding claim 3, Amako does not teach a thickness of the cured silicon. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the cured silicone from 10 to 200  $\mu\text{m}$  to provide an effective engagement between a subassembly and a device.

In addition, it would have been obvious to one of ordinary skill in the art at the time of the invention to have a thickness of the cured silicone in a range recited in the pending claim since it has been held that where the general conditions of a claim are

Art Unit: 2811

disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claim 4, Amako discloses a composition of the organohydrogensiloxane to offset an alkenyl group (paragraph 0035).

Regarding claims 5-6, Shiobara discloses an inorganic silica filler with the surface area within the range of the recited limitation (col.7, lines 1-10).

Regarding claims 7-9, Amako discloses a concentration of a hydrosilylation catalyst inhibitor with platinum within the recited range (paragraphs 0030, 0031).

Regarding claims 10, Amako discloses the semiconductor package further comprising an organopolysiloxane resin consisting essentially of  $R^3SiO_{1/2}$  siloxane units and  $SiO_{4/2}$  siloxane units wherein  $R^3$  is independently selected from monovalent hydrocarbon and monovalent halogenated hydrocarbon groups (paragraphs 0017, 0037).

Regarding claims 11-12, Figure 1 of Amako discloses a packaging device further comprising a cured organopolysiloxane dome layer.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amako and Shiobara as applied to claim 1 above, and further in view of Fjelstad (US 6284563).

Regarding claim 13, the combined teachings of Amako and Shiobara shows a silicon wafer with a structure substantially identical to the instant invention except a connection of a metal trace.

Fjelstad shows a semiconductor package comprising a semiconductor wafer 100 having an active surface 115 comprising at least one integrated circuit 170, 175 wherein each integrated circuit has a plurality of bond pads 110, a cured silicone layer 140 with a

Art Unit: 2811

thickness range of 74-200 um covering a portion of the active surface of the wafer except the bond pads, and a metal trace 170, 175 having a proximal end attached to each bond pad 110 and a distal end lying on the surface of the cured silicone layer 140.

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Fjelstad to a semiconductor device of Amako and Shiobara to have a connection of the metal trace to a bond pad and a cured silicone layer since such a configuration alleviates stresses created between the substrate and the chip.

Claims 14-19 and 23-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fjelstad in view of Amako and Shiobara.

Regarding claim 14, Figures 1A-1F (col.8, lines 13-64) of Fjelstad show a the method comprising the steps of printing a silicone composition on at least a portion of an active surface (115) of a semiconductor (100) to form at least one silicone deposit (140), wherein the active surface comprises at least one integrated circuit (170, 175), each integrated circuit has a plurality of bond pads (110), at least a portion of each bond pad is not covered by the silicone deposit (as shown in Figure 1C), and heating the silicone deposit (140; cured silicon layer).

Fjelstad fails to teach a specific silicone composition recited in the pending claim. Figure 1 of Amako shows a semiconductor device, which has a silicone composition on a portion of the active surface of a silicon chip and the silicone composition comprising an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule (paragraph 0016) with any remaining silicon-bonded organic groups being independently

Art Unit: 2811

selected from monovalent hydrocarbon groups (paragraph 0017) free of aliphatic unsaturation (paragraph 0021), an organohydrogensiloxane containing an average of at least two silicon-bonded hydrogen atoms per molecule (paragraph 0035), an inorganic filler (paragraph 0038), a hydrosilylation catalyst (paragraph 0030), and heating the silicone deposit to form the cured silicone member (paragraph 0039).

Since Akamo discloses a cured silicone member having the same composition to the Applicant's disclosure, it is inherent or alternatively obvious that the cured silicone of Akamo has a coefficient of linear expansion and a modulus in a vicinity of the range recited in the pending claim.

Amako discloses the substantially the entire claimed structure of the silicone composition except "a inorganic filler having a area surface less that 25 m<sup>2</sup>/g." Shiobara discloses an organic filler used in the curable resin having a surface area less than 25 m<sup>2</sup>/g for a semiconductor packaging (col.7, lines 4-9). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teaching of Shiobara to a semiconductor device of Amako to avoid contact failure between the contact interfaces through lowering molding pressure.

In addition, Shiobara further discloses that a particular size (which can be expressed in terms of the surface area) of the filler can be determined based on the configuration of the packing device (col.1, lines 1-29).

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the teachings of Amako and Shiobara for the compliant layer of Fjelstad in order to have the cured silicone layer with a specific composition as

Art Unit: 2811

recited in the pending claim to improve the adhesion through better curability as taught by Amako (paragraph 0001- paragraph 0002).

Regarding claims 15-19, 23-25 and 30-32 have been discussed above in claims 2-6, 10-12 and 7-9 in concordance.

Regarding claims 26 and 27, Fjelstad discloses that the printing step is carried out using stencil printing or screen printing (col.9, lines 54-56).

Regarding claim 28, Amako discloses that the silicone deposit is carried put at 150° for 30 minutes (paragraph 0054).

Regarding claim 29, Fjelstad shows further comprising the step of forming a metal trace 170, 175 on the wafer 110, a cured silicone layer 140 with a thickness range of 74-200 um covering a portion of the active surface of the wafer except the bond pads, and the metal trace 170, 175 having a proximal end attached to each bond pad 110 and a distal end lying on the surface of the cured silicone layer 140.

### ***Response to Arguments***

Applicant's arguments filed November 2, 2004 have been fully considered but they are not persuasive.

The rejection stands, and Examiner presents the remarks below in response to Applicant's argument.

1. Applicant mainly argues that "The applicants respectfully disagree for the reasons presented in the Reply dated 2 August 2004 and because Amako does not disclose (A) an organopolysiloxane containing an average of at least two silicon-bonded alkenyl groups per molecule with any remaining silicon-bonded organic groups being



Art Unit: 2811

independently selected from monovalent hydrocarbon groups free of aliphatic unsaturation. In contrast, Amako discloses a curable organopolysiloxane composition comprising A an organopolysiloxane containing an average of at least two alkenyl groups and at least two silicon-bonded hydrogen atoms per molecule, B a compound containing alkenyl and hydromxyphenyl groups in each molecule, and C a hydrosilylation catalyst (paragraph [0008]): Amako's component A contains BOTH silicon-bonded alkenyl groups AND silicon-bonded hydrogen atoms in the same molecule. Amako's component A differs from component (A) in claim I of this invention because, in addition to the silicon-bonded alkenyl groups, not all of the silicon-bonded radicals remaining in Amako's component A are organic groups because some of these silicon-bonded radicals are silicon-bonded hydrogen atoms. Therefore, Amako does not teach or suggest component (A) in claim 1 of this invention because component (A) of this invention has alkenyl groups and other organic groups bonded to silicon atoms (paragraph [00291]. Component {A} in claim 1 of this invention does not contain silicon-bonded hydrogen atoms, as required for component A of Amako.A” Examiner disagrees. As shown in a detailed chemical structure, such as the first example of organopolysiloxanes in paragraph [0020] of Amako clearly shows any remaining silicon-bonded groups are comprised of monovalent hydrocarbon groups free of aliphatic unsaturation. It is noted that silicon bonded hydrogen atom of Amako is not bonded to a *remaining* silicon bonded portion.

2. Applicant further argues that “Amako does not teach or suggest printing any silicone compositions. Amako does not disclose any semiconductor wafers. One skilled in the art would recognize that the silicon chip in Figure 1 of Amako is not a wafer.

Art Unit: 2811

Furthermore, Amako does not disclose a semiconductor wafer, an active surface; at least one integrated circuit, or a plurality of bond pads.” Examiner disagrees. One in skilled in the art would understand that the disclosure in Figure 1 and in particular, the background of the invention of Amako is applied for “a semiconductor wafer, an active surface; at least one integrated circuit, or a plurality of bond pads.”

### *Conclusion*

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

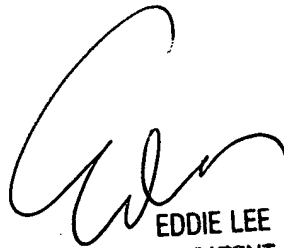
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on **MON.-FRI. 8:30AM-5:00PM**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2811

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi



EDDIE LEE  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800